

AMENDMENT UNDER 37 C.F.R. §1.111
U.S. Appln. No. 10/634,848

AMENDMENTS TO THE SPECIFICATION

Page 1, second full paragraph, delete in its entirety, and replace with the following:

In order to produce a polymer film, such as a cellulose acylate film and the like, polymers are dissolved in a solvent to prepare a low concentration dope, namely, a polymer solution or a polymer dispersion solution having low concentration. The low concentration dope has lower concentration than a high concentration dope which is used for forming a polymer film. After preparation, the low concentration dope is often concentrated to the high concentration dope. The high concentration dope is used for forming the polymer film in a method for producing the polymer film to obtain it. Thus, the time for dissolving the solute becomes shorter, and it is prevented that the undissolved material remains in the low concentration dope. As a method of concentrating the low concentration dope, there are methods of flash evaporation and a thin film evaporation. In the method of flash evaporation, especially of spray flash evaporation disclosed in United States Patent No. 4,414,341, the heated low concentration dope is fed out from a nozzle ("orifice") in a tank, and thereby forms tiny droplets such that the total size of surfaces of the tiny droplets ~~may~~ becomes larger. Accordingly, the solvent in the low concentration dope can be easily evaporated.

Page 2, first full paragraph, delete in its entirety, and replace with the following:

As shown in FIG. 7, in a method of the spray flash evaporation in the prior art, for example, a concentrating apparatus 140 is used. The concentrating apparatus includes a tank main body 141 and a jacket 142 for controlling a temperature of the tank main body 141, and a medium 143 flows in a space between the tank main body 141 and the jacket 142. In an upper

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side, the tank main body 141 has a nozzle 148 for performing a flash evaporation of a low concentration dope 147 which has been filtrated with a filtration apparatus 152. An end 148a of the nozzle 148 is positioned over a surface 144a of ~~an-a~~ concentrating dope 144, which is obtained from the low concentration dope 141 through flash evaporation and contained in the tank main body 141. In the tank main body ~~144~~¹⁴⁷, there is a stirrer 145 for stirring the concentrating dope 144. The stirrer 145 is connected with a motor 146 and controlled a rotation thereof. Further, a condenser 149 is connected through a pipe 150 to the tank main body 141. In the tank main body 141, a solvent of the concentrating dope 144 is evaporated to become a gas solvent 144b, and the gas solvent 144b is condensed with the condenser 149. Thereby, the concentrating dope 144 is concentrated to a high concentration dope 151, and the high concentration dope 151 is fed out and filtrated with a filtration apparatus 153 to use for forming the polymer film.

Page 2, second paragraph, spanning pages 2 and 3, delete in its entirety, and replace with the following:

However, when the low concentration dope 147 is fed out from the nozzle 148, tiny droplets 147a of the low concentration dope 147 ~~is sprayed~~^{are sprayed}, and some of the tiny droplets 147a are adhered on an inner wall 141a of the tank main body 141 to generate a skinning 147b, easily. The skinning 147b varies the composition of the high concentration dope 151 and pollutes the inside of the tank main body 141. The skinning 147b is removed from the high concentration dope 151 by the filtration apparatus 153, and when the filtration apparatus 153 is stopped with the skinning, the filtration apparatus 153 is exchanged ~~to~~^{for} another ~~one~~^{one}

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~~much one.~~ In this case, ~~the~~ time for exchange of the high concentration dope 151 is ~~necessary~~ ~~necessary,~~ and flow rate varies, which prevents to continuously obtain the high concentration dope 151 having a uniform concentration. Further, a little of the high concentration dope 151 remains in the removed filtration apparatus 153 at exchange. Furthermore, the removed filtration apparatus 151 is cleansed with solvent. Accordingly, cost therefore cannot be reduced.

Page 3, first full paragraph, delete in its entirety, and replace with the following:

Further, in order to prevent the concentrating dope 144 from drying, a temperature of the inner wall 141a is lower than the boiling point of the concentrating dope 144. However, in the method of flash evaporation in the prior art, when the temperature of the inner wall 141a is lower than the boiling point, the solvent gas 144b is condensed on the inner surface 141a, ~~which and the condensate~~ is often mixed with the concentrating dope ~~144~~144. Thus the concentrating dope ~~144~~144 is ~~diluted~~diluted, and the ~~effect efficiency~~ of concentrating the low concentration dope ~~144~~147 becomes lower. Further, in order to evaporate the solvent uniformly, the concentrating apparatus 140 must have such a large space (whose capacity is from 200L to 10000L) that the dope surface 144a is enough large and the tiny droplets 147a ~~is~~are hardly adhered to the inner wall 141a, while the stirrer 145 stirs the concentrating dope 144. Therefore it is hard to secure a space for setting the concentrating apparatus ~~144~~140. Furthermore, as the capacity of the concentrating apparatus 144 is large, the concentrating dope 144 remains in the tank main body 145 for from one to four hours. Accordingly, the high concentration dope 151 is sometimes denatured.

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Page 3, last paragraph, spanning pages 3 and 4, delete in its entirety, and replace with the following:

Furthermore, as the low concentration dope is sprayed in a gas phase, gas is dissolved ~~theretotherein~~, and the concentrating dope 144 contains a larger amount of gas. When the high concentration dope prepared from such concentrating dope 144 is cast dried on a band, ~~the~~ gas is generated, which prevents the formation of ~~the-a~~ polymer film having a smooth surface. Accordingly, degassing from the high concentration dope is necessary before use for forming the polymer film.

Page 4, third full paragraph, delete in its entirety, and replace with the following:

The concentrating tank includes a tank main body for containing the solution ~~in~~ and concentrating the solution and a roof disposed on said tank main body. An inclined inner surface of the roof forms a condensing surface for condensing the solvent gas.

Page 4, fourth full paragraph, delete in its entirety, and replace with the following:

A gutter is attached near a lower end of the roof to the tank main body so as to receive the condensed solvent flowing downwards on the condensing surface. ~~Temperature~~ The temperature of the ~~an~~ inner surface of the roof is lower than that of the solution in the tank main body.

Page 5, first full paragraph, delete in its entirety, and replace with the following:

Further, in the method of the present invention, a height of the solution surface of the solution in the tank main body is preserved constant. ~~Time for~~ The time that the solution stays in the concentrating tank is from 0.5 minute to 20 minutes.

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Page 5, fifth paragraph, spanning pages 5 and 6, delete in its entirety, and replace with the following:

In the present invention, a concentration tank for the concentrating a polymer solution includes a tank main body and a roof disposed on the tank main body. In the tank main body, the polymer solution is temporary contained while it is concentrated. The roof has ~~a-an~~ inclined inner surface which forms a condensing surface for a solvent gas evaporated from the polymer solution. At least one flash nozzle is inserted to the tank main body. The flash nozzle is disposed under a solution surface of the polymer solution in the tank main body, and discharges a supplied fresh polymer solution into the polymer solution which is concentrated in the tank main body. A draining pipe is connected to a bottom of the tank main body for draining a concentrated polymer solution.

Page 6, first full paragraph, delete in its entirety, and replace with the following:

In the concentration tank, an end of the flash nozzle is bent to have an L-shape towards the bottom of the tank main body. ~~the-The~~ roof has a ~~corn-like-cone-like~~ shape, and the tank main body has a bowl-like shape.

Page 6, second full paragraph, delete in its entirety, and replace with the following:

According to the method for concentrating the low concentration solution of the invention, as the solvent gas generated from the solvent in the low concentration solution is condensed in the concentrating apparatus, the generation of the skinning is prevented, and ~~effects~~ the efficiency of concentrating the low concentration solution becomes larger. Further, in the concentrating apparatus of the present invention, ~~effects~~ the efficiency of concentrating the low

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concentration solution is large. Accordingly, the size of the concentrating apparatus is one hundredth smaller than that of the prior art. Further, as the flash evaporation is made in the concentrating solution, degassing can be easily made.

Page 14, second full paragraph, delete in its entirety, and replace with the following:

In the concentrating apparatus 44, while the low concentration dope 30 becomes the high concentration dope 67, a solvent gas 57a (see, FIG. 2) is violently generated from part of the low concentration dope 30, and thereafter condensed to a condensed solvent 57b (see FIG. 2) is obtained. (see Fig. 2). The condensed solvent 57b is drawn through an adjusting valve 64, 61 and a flow meter 62 into a recovery solvent tank 63. Then the condensed solvent 57b is transported to a preparation apparatus 64 and reused after preparation as the solvent for dissolving the polymer.

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Page 16, second paragraph, spanning pages 16 and 17, delete in its entirety, and replace with the following:

A solvent gas 57a of the solvent is generated in flash evaporation and condensed on a condensing surface 55a of the condensation roof 55 to obtain a condensed solvent 57b. The condensed solvent 57b has ~~a~~the form of ~~a~~ drop or extends on the condensing surface 55a ~~in~~ due to the effect of the surface tension of the condensing surface 55a. As the condensing surface 55a is inclined, the condensed solvent 57b flows downwards in effects of gravity (and surface tension thereof). Thus the condensed solvent 57b is received by a gutter 58, and thereafter flows out from the condensing apparatus 44. Further, a pressure gauge 50a is attached to the tank main body 50 to measure the inside pressure thereof. ~~Amount~~ The amount of the low concentration dope 30 for flash evaporation and ~~the~~ temperatures of the flash section and the condensation roof 55 are controlled on the basis of data obtained by the pressure gauge 50a. Note that the condensation surface 55a is made of materials, such as SUS 316, SUS 316L, Hastelloy (trade name), in order to have an adequate surface tension. Further, it is preferable that grooves are formed on the condensing surface 55a to extend in a direction in which the condensed solvent 57b flows to the gutter 58. In this case, as ~~the~~ effect of surface tension of the condensing surface becomes larger, the ~~recovery~~ recovered condensed solvent 57 hardly falls into the flash section. The number and the shape of the grooves can be determined optionally.

Page 22, first full paragraph, delete in its entirety, and replace with the following:

A band 88 is disposed below the casting die 84 and supported with rollers 86, 87. The rollers 86, 87 are rotated by a driver (not shown) such that the band 88 moves in an arrowed

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direction. When the pump 82 is driven, then the high concentration dope 67 is fed to the filtration apparatus 83 in which impurities and the like are removed from the high concentration dope 67. Thereafter, the high concentration dope 67 is fed to the casting die 84, and is cast from the casting die 84 on the band 88. The high concentration dope 67 becomes gel-like film at first, and thereafter dried on the band 88 to have a self-supporting property. Property, and the gel-like film is peeled from the band 88 by a peel roller 90 to be the polymer film 91. Thus Thus, the high concentration dope 67 forms the polymer film 91, and a peel roller 111 peeled from the band 88. 91.

Page 22, third paragraph, spanning pages 22 and 23, delete in its entirety, and replace with the following:

The polymer film 91 is transported to a tension frame or a tenter 92, in which the hot air is blown to dry the transported polymer film 91. In this case, the polymer film 91 was tensed stretched at least in a widthwise direction to have a predetermined width. In this embodiment, the high concentration dope 67 is cast on the continuous band 88. However, the method of producing a polymer film is not restricted in it, and the high concentration dope 67 may be cast on a rotary drum.

Page 23, second full paragraph, delete in its entirety, and replace with the following:

In the above embodiment, the number of the high concentration dope dopes cast on the band is one. However, the number is not restricted in it to one. For example, in FIG. 5, a casting die 103 is a multi-manifold casting die having plural manifolds 100, 101, 102 that can be supplied with the high concentration dope 67 and other sorts of two dopes 104, 106 through feed

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pipes (not shown). The dopes 67, 104, 106 are joined downstream from the manifolds 100-102 and cast on the band 88 to be a gel-like film 89 having a three-layer structure. After drying the high concentration dope 67 and the dopes 104, 106, a polymer film (not shown) is obtained. Note that the casting die is not restricted in this description in the method for forming the polymer film. For example, a feed block in which the plural dopes are joined may be provided upstream from the casting die to cast several sorts of the dopes on the band 88 at the same time.

Page 25, second full paragraph, delete in its entirety, and replace with the following:

The formed polymer film 91 is cut to obtain five film samples having size of 5 cm^2 . Each film sample, while being sandwiched between polarizes films in cross-nicol position, is observed to know whether there is a light point defect. When the criterion of the light point defect is satisfied, then it is determined that the polymer film has good characteristics and the low concentration dope is concentrated to the high concentration dope without generating the skinning in the tank main body 50 of the concentrating apparatus 44. The criterion is that the number of the light point ~~defect~~defects having size of at least $20\text{ }\mu\text{m}$ is zero in 5 cm^2 on the film sample, that having size of at least $10\text{ }\mu\text{m}$ and less than $20\text{ }\mu\text{m}$ is ten, or that having size of at least $5\text{ }\mu\text{m}$ and less than $10\text{ }\mu\text{m}$ is ten.